What is claimed is:

1. A coated substrate, which comprises:

a) a substrate of a conductive metal; and

b) a coating of at least a ruthenium-containing compound provided on a surface of the substrate, wherein the coating is characterized as comprising particles having been formed from an ultrasonically generated aerosol of the ruthenium-containing compound dissolved in a solvent substantially devoid of alcohol contacted with the substrate.

2. The coated substrate of claim 1 wherein the ruthenium-containing compound is a ruthenium-containing oxide, or a precursor thereof.

3. The coated substrate of claim 2 wherein the precursor of the ruthenium-containing oxide is selected from the group consisting of a nitrate, a sulfate, a phosphate and a chloride.

4. The coated substrate of claim 2 wherein the precursor is either ruthenium nitrosyl nitrate or ruthenium chloride.

5. The coated substrate of claim 1 wherein a majority of the particles have diameters of less than about 10 microns.

6. The coated substrate of claim 1 wherein an internal surface area of the coating is about 10 m^2/gram to about 1,500 m^2/gram.

7. The coated substrate of claim 1 wherein the coating includes a second metal.

8. The coated substrate of claim 7 wherein the second metal is selected from the group consisting of tantalum, titanium, nickel, iridium, platinum, palladium, gold, silver, cobalt, molybdenum, niobium, ruthenium, manganese, tungsten, iron, zirconium, hafnium, rhodium, vanadium, osmium, and mixtures thereof.

9. The coated substrate of claim 1 wherein the coating is comprised of ruthenium and tantalum.

10. The coated substrate of claim 1 wherein the coating has a thickness of about a hundred Angstroms to about 0.1 millimeters.

11. The coated substrate of claim 1 wherein the substrate is selected from the group consisting of tantalum, titanium, nickel, molybdenum, niobium, cobalt, stainless steel, tungsten, platinum, palladium, gold, silver, copper, chromium, vanadium, aluminum, zirconium, hafnium, zinc, iron, and mixtures thereof.

12. The coated substrate of claim 1 wherein the substrate has a thickness of about 0.001 to 2 millimeters.

13. The coated substrate of claim 1 wherein the substrate is characterized as having had its surface area increased prior to being coated.

14. The coated substrate of claim 13 wherein the increased surface area is characterized as having been formed by contacting the substrate with an acid.

15. The coated substrate of claim 13 wherein the increased surface area is characterized as having been formed by mechanical means including rough threading, grit blasting, scraping, plasma etching, abrading and wire brushing the substrate.

16. The coated substrate of claim 1 wherein the substrate is characterized as having been cleaned by one of the group consisting of an aqueous degreasing solution, a non-aqueous degreasing solution and plasma cleaning prior to being coated.

17. The coated substrate of claim 1 wherein the substrate is characterized as having had its surface increased in electrical conductivity.

18. The coated substrate of claim 1 wherein the aerosol is characterized as having been formed by subjecting the solution to ultrasonic sound waves at a frequency of about 20,000 hertz and above.

19. The coated substrate of claim 1 wherein the aerosol is characterized as having been formed by subjecting the solution to ultrasonic sound waves at a substantially atmospheric pressure of at least about 600 millimeters of mercury.

20. A method for providing a coated substrate, comprising the steps of:

a) providing the substrate having a surface to be coated;

b) providing a solution comprised of a solvent substantially devoid of alcohol and having a ruthenium-containing compound dissolved therein;

c) heating the substrate;

d) subjecting the solution to ultrasonic sound waves thereby causing the solution to form into an aerosol;

e) contacting the heated substrate with the aerosol thereby forming a coating of ultrasonically generated particles of the ruthenium-containing compound on the substrate, wherein the substrate is heated to a first temperature of at least about 100°C and sufficient to at least partially evaporate the solvent from the substrate; and

f) further heating the ultrasonically coated substrate to a second temperature of at least about 300°C to cause the ruthenium-containing compound to completely form and adhere to the substrate.

21. The method of claim 20 wherein the ruthenium-containing compound is a ruthenium-containing oxide or a precursor thereof.

22. The method of claim 21 wherein the precursor of the ruthenium-containing oxide is selected from the group consisting of a nitrate, a sulfate, a phosphate and a chloride.

23. The method of claim 21 including providing the precursor as either ruthenium nitrosyl nitrate or ruthenium chloride.

24. The method of claim 20 including providing a majority of the particles having diameters of less than about 10 microns.

25. The method of claim 20 including providing an internal surface area of the coating of about 10 m^2/gram to about 1,500 m^2/gram.

26. The method of claim 20 including providing the coating having a thickness of about a hundred Angstroms to about 0.1 millimeters.

27. The method of claim 20 including providing a second metal in the solution.

28. The method of claim 27 including selecting the second metal from the group consisting of tantalum, titanium, nickel, iridium, platinum, palladium, gold, silver, cobalt, molybdenum, ruthenium, manganese, tungsten, iron, zirconium, hafnium, rhodium, vanadium, osmium, niobium, and mixtures thereof.

29. The method of claim 20 including providing a second metal in the solution and wherein the solution includes a mixture of ruthenium and tantalum.

30. The method of claim 20 including selecting the substrate from the group consisting of tantalum, titanium, nickel, molybdenum, niobium, cobalt, stainless steel, tungsten, platinum, palladium, gold, silver,

copper, chromium, vanadium, aluminum, zirconium, hafnium, zinc, iron, and mixtures thereof.

31. The method of claim 20 including increasing the surface area of the substrate prior to contacting the aerosol.

32. The method of claim 19 including increasing the substrate surface area by contacting the substrate with an acid.

33. The method of claim 31 including increasing the substrate surface area by a mechanical process selected from the group consisting of rough threading, grit blasting, scraping, plasma etching, abrading and wire brushing.

34. The method of claim 20 including cleaning the substrate by one of the group selected from an aqueous degreasing solution, a non-aqueous degreasing solution and a plasma cleaning process prior to being coated.

35. The method of claim 20 including increasing the electrical surface conductivity of the substrate prior to contacting the substrate with the aerosol.

36. The method of claim 20 including providing the substrate having a thickness of about 0.001 to about 2 millimeters.

37. A method for providing a coated substrate, comprising the steps of:

a) providing the substrate having a surface to be coated;

b) providing a solution comprised of a solvent substantially devoid of alcohol and having a ruthenium-containing oxide compound or a precursor thereof dissolved therein;

c) heating the substrate to a first temperature of at least about 100°C;

d) subjecting the solution to ultrasonic sound waves, thereby causing the solution to form into an aerosol;

e) contacting the heated substrate with the aerosol, thereby at least partially evaporating the solvent from the substrate and forming a coating of ultrasonically generated particles of the ruthenium-containing oxide or precursor thereof on the substrate; and

f) further heating the ultrasonically coated substrate to a second temperature of at least about 300°C to cause the ruthenium-containing oxide compound to completely form and adhere to the substrate or to convert the precursor thereof to the ruthenium-containing oxide compound adhered to the substrate.

38. A method for providing a coated substrate, comprising the steps of:

a) providing the substrate having a surface to be coated;

b) providing a solution comprised of a solvent substantially devoid of alcohol and having a

ruthenium-containing oxide compound or a precursor thereof dissolved therein;

c) heating the substrate to a first temperature of at least about 100°C;

d) subjecting the solution to ultrasonic sound waves, thereby causing the solution to form into an aerosol;

e) contacting the heated substrate with the aerosol, thereby at least partially evaporating the solvent from the substrate and beginning forming a coating of ultrasonically generated particles on the substrate; and

f) further heating the ultrasonically coated substrate to at least a second temperature of at least about 300°C at a rate of about 1°C/minute to about 6°C/minute to cause the ruthenium-containing oxide compound to completely form and adhere to the substrate or to convert the precursor thereof to the ruthenium-containing oxide compound adhered to the substrate.